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Fig. 1

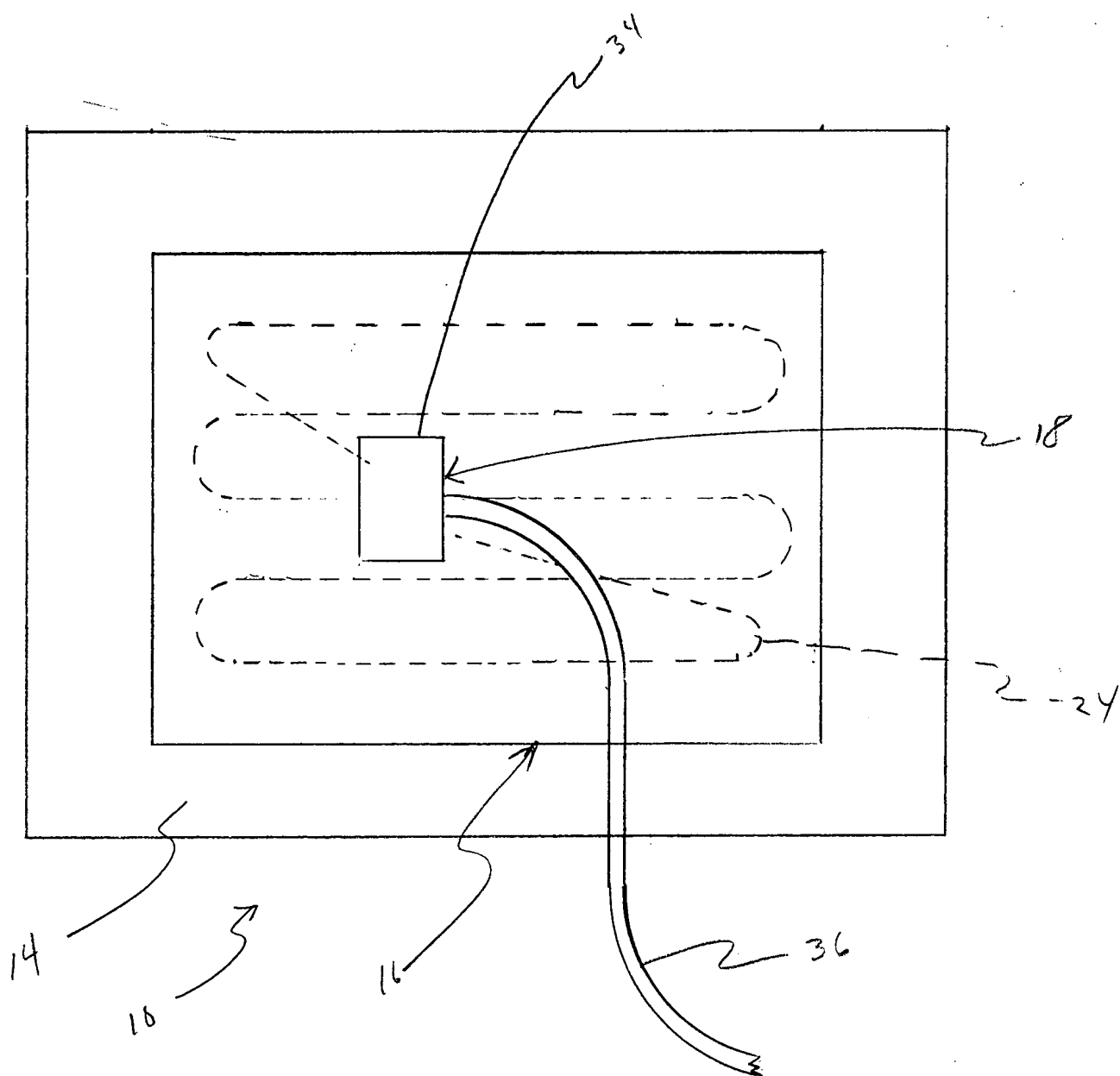
1. *Chlorophyll a* (Chl *a*) is the primary photosynthetic pigment in most plants and algae. It is a green pigment that absorbs light energy in the blue and red regions of the visible spectrum. Chl *a* is essential for the light-dependent reactions of photosynthesis, where it converts light energy into chemical energy.

2. *Chlorophyll b* (Chl *b*) is an accessory pigment found in green plants and algae. It is a yellow-green pigment that absorbs light energy in the blue and orange-red regions of the visible spectrum. Chl *b* transfers the absorbed energy to Chl *a* for use in photosynthesis.

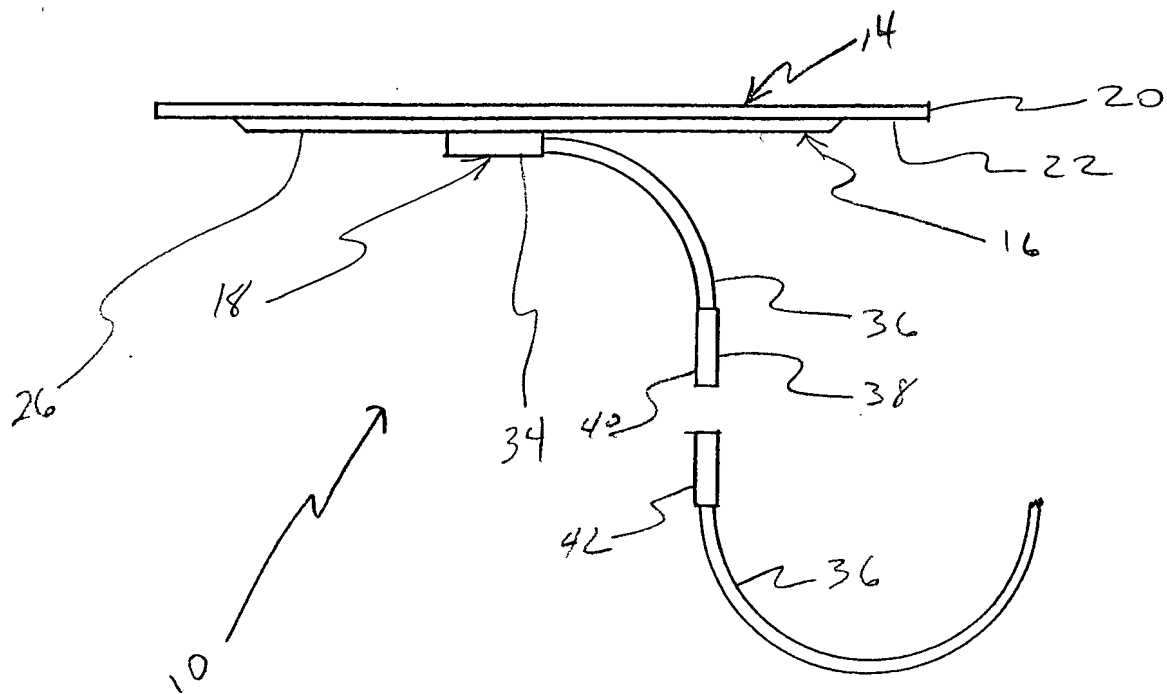
3. *Carotenoids* are a group of pigments that include carotenes and xanthophylls. They are responsible for the yellow, orange, and red colors seen in autumn foliage. Carotenoids absorb light energy in the blue and green regions of the visible spectrum and transfer the energy to Chl *a*. They also play a role in protecting the photosynthetic apparatus from damage by reactive oxygen species.

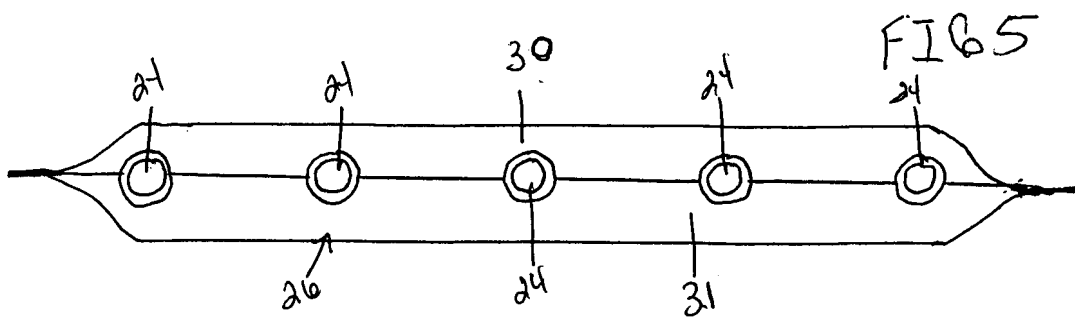
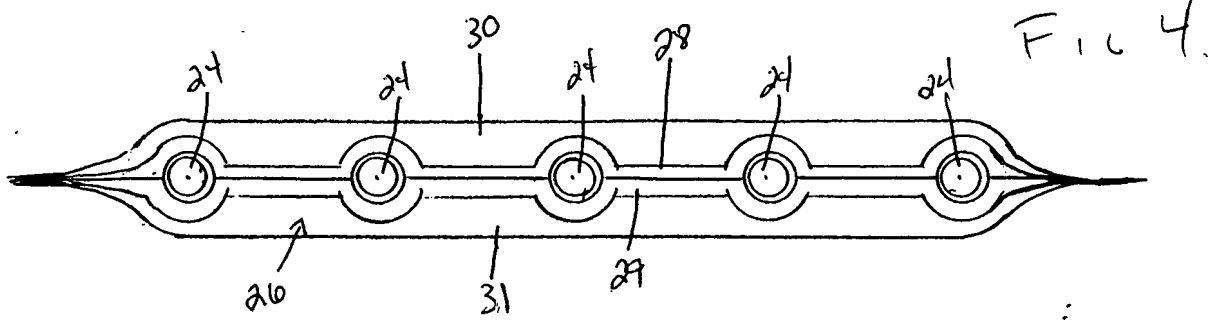
4. *Xanthophylls* are a subclass of carotenoids that are primarily responsible for the yellow color of autumn leaves. They absorb light energy in the blue and green regions of the visible spectrum and transfer the energy to Chl *a*. Xanthophylls also play a role in the xanthophyll cycle, which helps to dissipate excess light energy and protect the photosynthetic apparatus from damage.

5. *Anthocyanins* are water-soluble pigments that are responsible for the red, purple, and blue colors seen in many autumn leaves. They are not directly involved in photosynthesis but are produced by the plant in response to various environmental factors, including light stress and low temperatures.



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FIG 6

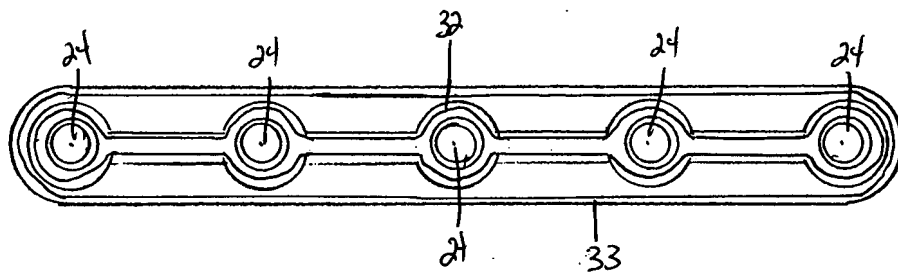
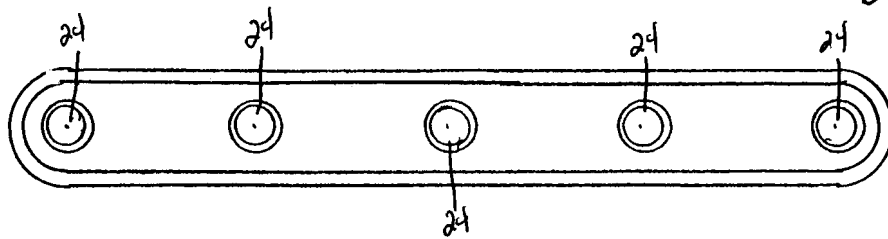


FIG 8





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FIG 7

FIG 9

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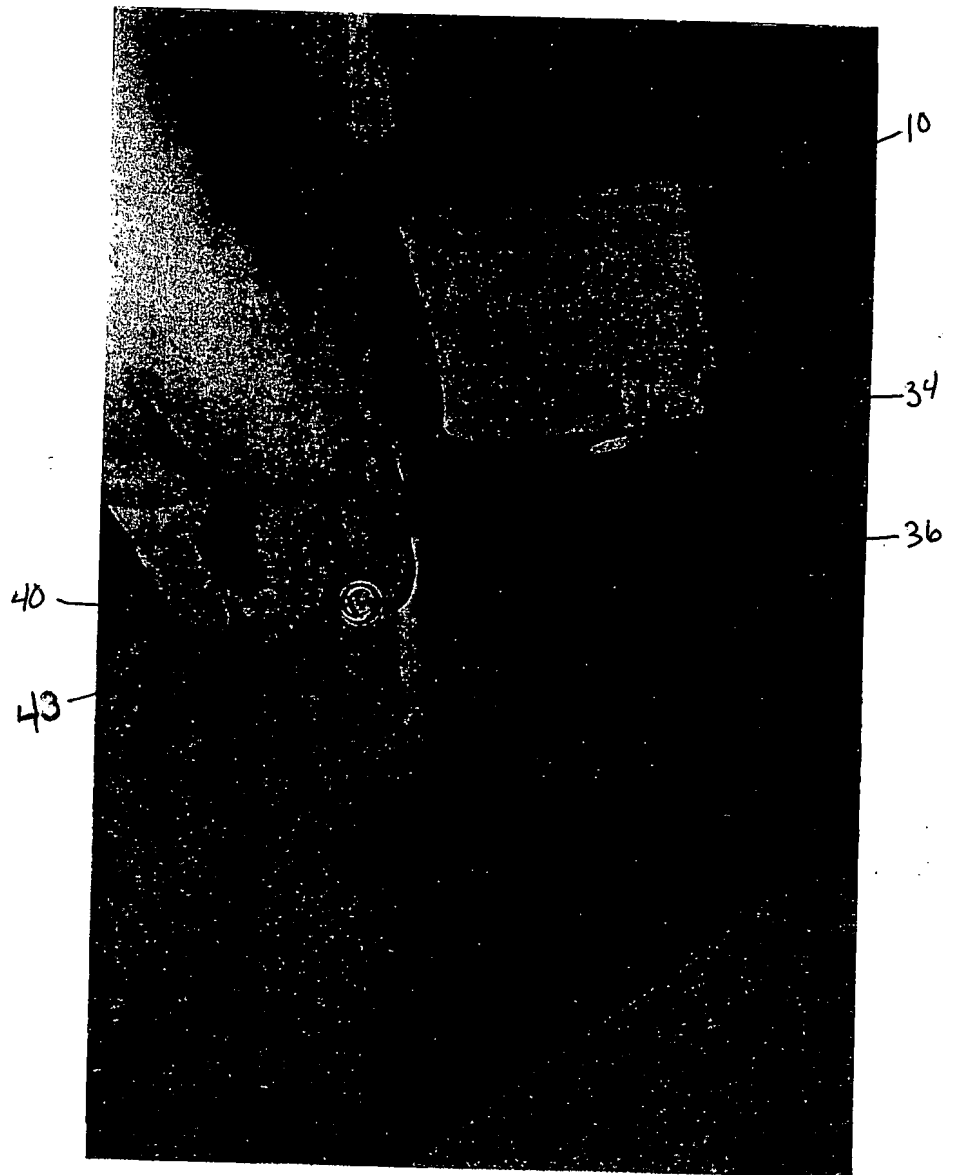
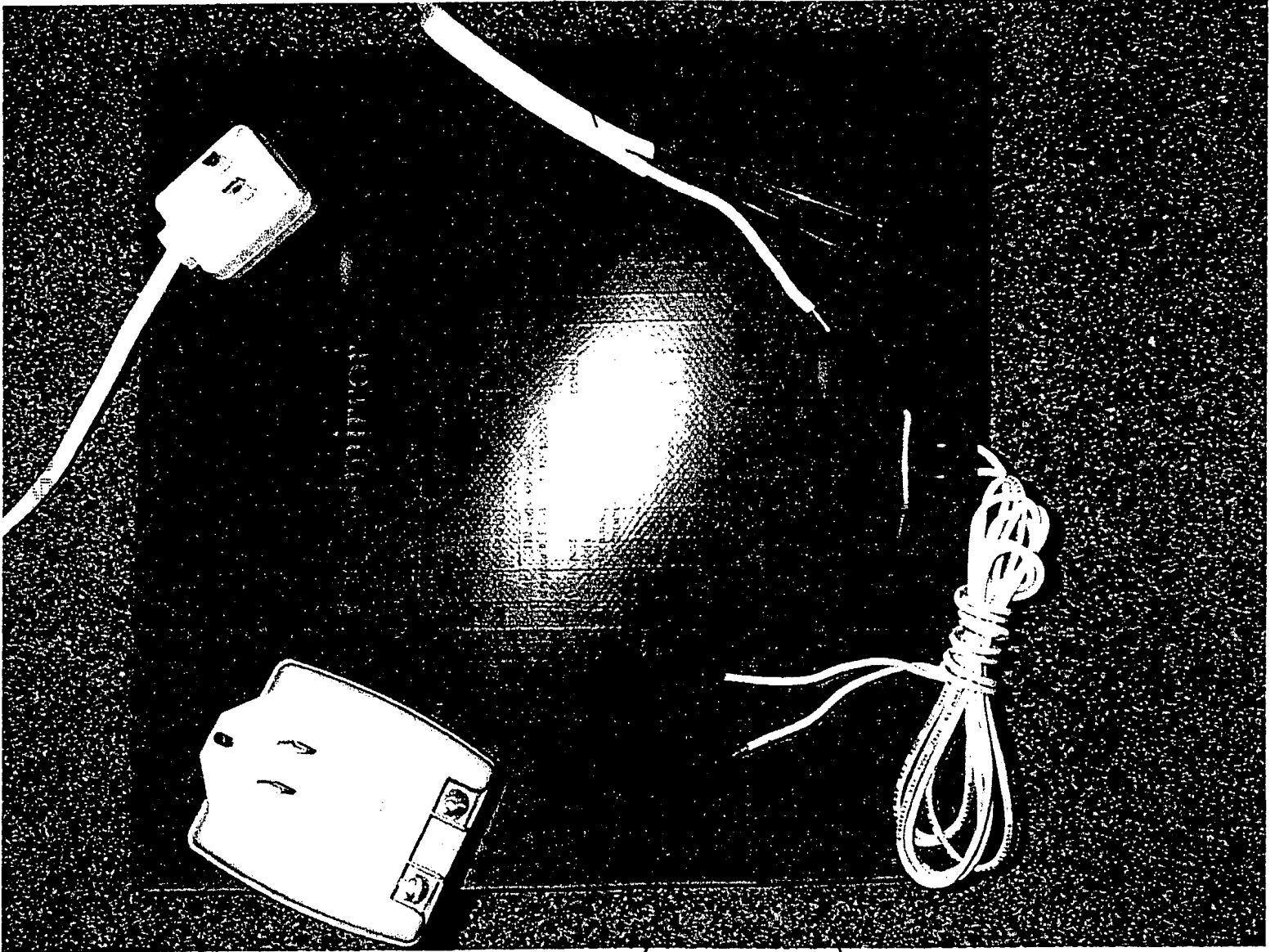


FIG 10



FIG. 11



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FIG 12

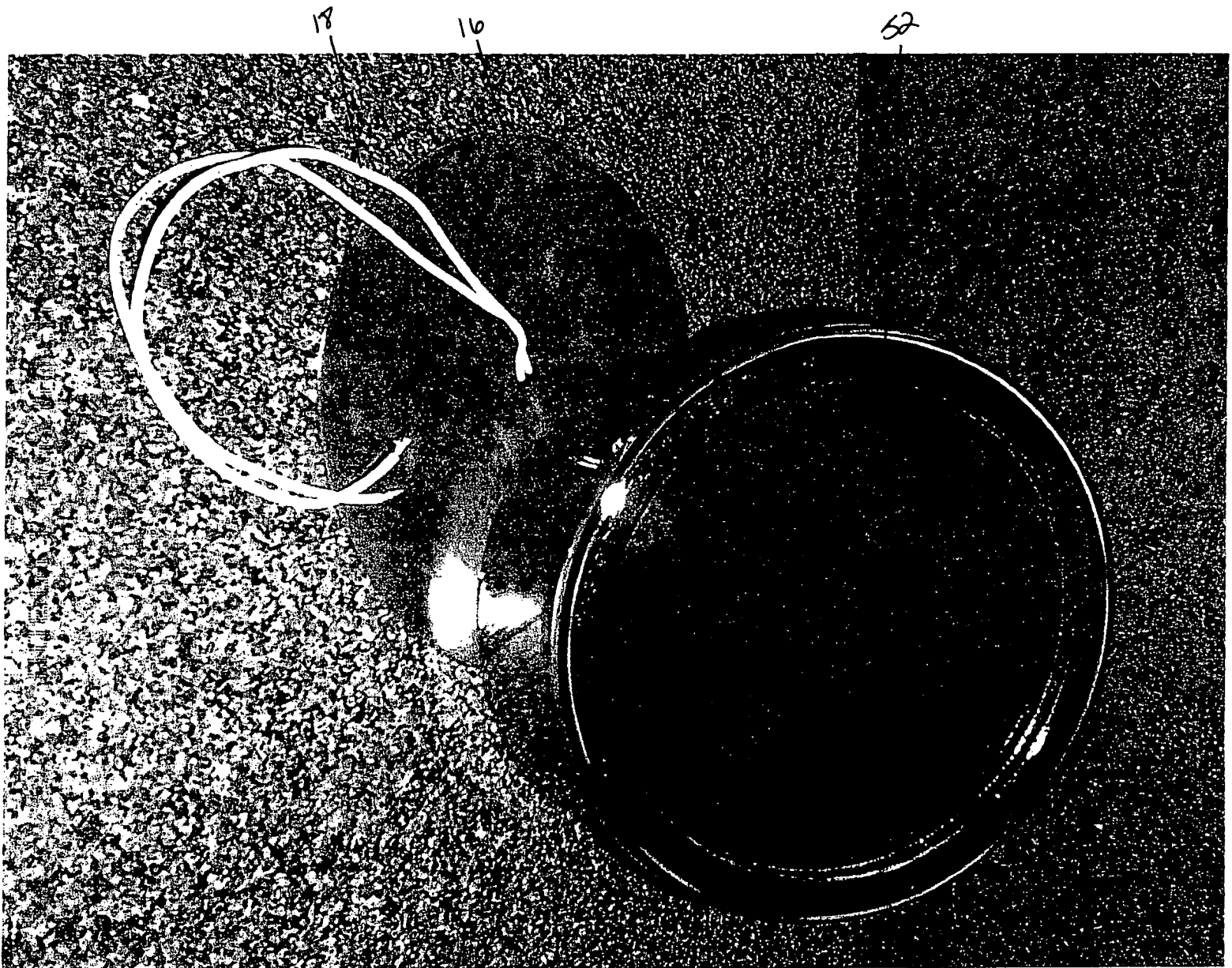


FIG 13